Abstract of the Disclosure

A line spectral frequency (LSF) coefficient vector quantizer greatly affects wideband speech coding efficiency and performance.   An LSF coefficient quantizer of an existing speech codec can be modified into a new structure in which a non-structural vector quantizer and a lattice quantizer are connected in series. Thus, memory capacity and search time required for the LSF coefficient quantizer can be reduced.   In addition, a prediction structure and a non-prediction structure can be connected in parallel to stably perform quantization and reduce a quantization transfer error.   As a result, an efficient LSF quantizer capable of reducing allocated bits and improving SD can be provided.   Moreover, non-structural vector quantization can be performed prior to pyramid vector quantization to convert an input value into a Laplacian model suitable for a pyramid vector quantizer.   Also, a high-performance quantizer can be provided by determining a joint optimisation vector between two serial quantizers using a small amount of computation of the pyramid vector quantizer.   Furthermore, outliers unsuitable for the prediction structure can be correctly quantized by adopting the prediction structure and the non-prediction structure.